

cide feast, from which all details longed for by the scientific entomologist, regarding the natural affinities of genera, facts of local variation, and so forth, are eliminated. In these respects the present work strikes us as a superior one of its class. The author enters fully into the structure and metamorphoses of the different groups, discusses their natural relationships, and under each species gives full details regarding geographical distribution and variation.

In dealing with these generalities he is, at the same time, never unnecessarily diffuse; and his remarks and conclusions are those of a writer evidently well acquainted with his subject. The figures, in chromolithography by West, Newman, and Co., are excellent, and indicate a distinct advance in this department of art. Full descriptive characters are given of all species and genera, as well as of groups superior to genera. Such a work is deserving of all encouragement, and we trust that its success will answer the expectations of its promoters, the chief of whom, we are informed in the prospectus, is Mr. D. Logan of Penang.

PROCEEDINGS OF LEARNED SOCIETIES.

GEOLOGICAL SOCIETY.

June 7, 1882.—J. W. Hulke, Esq., F.R.S.,
President, in the Chair.

The following communications were read:—

1. "Notes on the Annelida Tubicola of the Wenlock Shales, from the Washings of Mr. George Maw, F.G.S." By George Robert Vine, Esq. Communicated by Prof. P. Martin Duncan, M.B., F.R.S., V.P.G.S.

The author commenced with a sketch of the bibliography of the subject and of the known Silurian genera of tubicolar Annelids. This was followed by a description of the following genera and their contained species:—*Cornulites*, *Conchicolites*, *Ortonia*, *Spirorbis*. Of the last there is one species (*S. minutus*) from the Buildwas Shale; this differs only in the slightest degree from *S. arkonensis*, described by Prof. Nicholson from the American Devonians. The new genus *Arenatubulites* is in many respects a peculiar and interesting form, having the tube composed of minute grains of sand, like *Sabellaria* and *Terebella*. The author describes two species, *A. elongata* and *A. amplexa*; they occur in the Pickwood beds. A description follows of the genus *Tentaculites*, which the author referred to the Tubicolar Annelids: and several species of it were described.

2. "Description of Part of the Femur of *Nototherium Mitchelli*." By Prof. Owen, C.B., F.R.S., F.G.S., &c.

The specimen described consisted of the distal portion, probably about one half, of a femur obtained from Darling Downs, Queens-

land, and received by the author from Dr. George Bennett. Its principal differences from *Diprotodon* are that it has no depression above the outer condyle, but in its place a rough longitudinal rising for the attachment of the same or of a homologous muscle; and the hinder surface of the outer condyle is transversely convex. The relative width of the post-condylar fossa resembles that in *Phascolumys*; and a further resemblance to the Wombats consists in the more equal prominence of the lateral boundaries of the rotular surface than in *Diprotodon* and *Macropus*. The bone differs from the corresponding part in the Wombats by several subordinate characters; and the animal to which it belonged would seem to have been intermediate between *Phascolumys* and *Macropus*. From the size and characters of the bone the author referred it to *Nototherium Mitchelli*; its breadth across the condyles is $5\frac{3}{4}$ in.

3. "On *Helicopora latispiralis*, a new spiral Fenestellid from the Upper Silurian beds of Ohio, U. S." By E. W. Clappole, Esq., B.A., B.Sc. (Lond.), F.G.S.

The author referred to the genus *Archimedes*, recognized by Lesueur, D. D. Owen, and James Hall, as a spiral form of Fenestellid, the remains of several species of which occur in Lower Carboniferous Limestone rocks in the United States. In *Archimedes* there is always a strong central shaft. The species here described by the author under the name of *Helicopora latispiralis* occurs in the Upper beds of the Niagara group of the Upper Silurian at Cedarville, Ohio; and the new genus is distinguished from *Archimedes* by the absence of the solid stony axis above mentioned. Its character as given by the author is as follows:—"Polyzoary expanded, fenestrate, and spiral, formed of slender bifurcating branches poriferous on one face, connected by non-poriferous bars, forming an open network; cells arranged in two rows along the branches, one row on each side of a median keel. Axis very thin, or consisting only of the thickened central border of the spiral polyzoary." The species described grows to as much as eight inches in diameter. The author has seen a second species of the genus.

June 21, 1882.—J. W. Hulke, Esq., F.R.S.,
President, in the Chair.

The following communications were read:—

1. "On *Thecospondylus Horneri*, a new Dinosaur from the Hastings Sand, indicated by the Sacrum and the Neural Canal of the Sacral Region." By Prof. H. G. Seeley, F.R.S., F.G.S.

The author described a mould of the neural canal of the sacral region of a Dinosaur, obtained by Dr. A. C. Horner, of Tonbridge, from a quarry in the Hastings Sand at Southborough. The specimen is about 2 feet long, slightly imperfect at both ends, but showing indications of five complete vertebræ, with traces of others at the two extremities, making at least seven vertebræ in all. The general

form of the neural chamber is compressed from side to side, and dilated from below upwards, especially in the region of the second, third, and fourth vertebræ, its depth over the third foramen being nearly $3\frac{1}{2}$ inches. Indications of bone preserved on the surface seem to show that the neural canal was enclosed in a mere bony film. The indications of transverse processes show that they were directed forward in front, outward in the middle, and backward behind. The first process on the right side, which is preserved, expands somewhat conically outwards and forwards, and terminates in a large flattened facet for the ilium. For the animal indicated by this specimen the author proposed to found a new genus, *Thecospondylus*, and named the species *T. Horneri*.

2. "On the Dorsal Region of the Vertebral Column of a new Dinosaur, indicating a new genus, *Sphenospondylus*, from the Wealden of Brook in the Isle of Wight, preserved in the Woodwardian Museum of the University of Cambridge." By Prof. H. G. Seeley, F.R.S., F.G.S.

In this paper the author described a series of six vertebræ, remarkable for the great lateral compression of the centrum, which is so narrowed inferiorly as to terminate in a sharp longitudinal ridge. The centra average about $3\frac{1}{2}$ inches in length. The neural arches are depressed; the transverse processes are at first directed backward, but soon become directed outward, retaining their upward direction; the facet for the head of the rib is at first large, placed at the base of the transverse process, and bounded behind by a sharp ridge which runs to the hinder margin of the neural arch; but afterwards the rib-head rises higher, so as to be chiefly above the zygapophysial facets; and then it becomes smaller, the ridge behind it disappears more or less, and the transverse process becomes vertically compressed and thin. The author referred to other vertebræ showing similar characters contained in the Fox Collection in the British Museum, but stated he had seen neither cervical nor caudal vertebræ of this type. The animal indicated by these remains was regarded by the author as constituting a new genus most nearly allied to *Iguanodon*, for which he proposed the name of *Sphenospondylus*; but he abstained from giving the type a specific name "in view of the likelihood of these vertebræ pertaining to the *Iguanodon Seeleyi*."

3. "On Organic Remains from the Upper Permian Strata of Kargalinsk in Eastern Russia." By W. H. Twelvetrees, Esq., F.G.S.

In this paper the author described the Kargalinsk steppe, north of Orenburg, as consisting of a grassy, treeless, undulating steppe, with sluggish, winding streams, in the banks of which, and in ravines, the exposures of subsoil show only red marl or sandstone devoid of fossils. Mine-borings and shafts go down through red, yellow, and grey sandstones and red and white marls, which are fossiliferous wherever the beds of copper-ore exist. On the eastern

border of the steppe there are two protrusions of limestone, with *Terebratula elongata*, *Loxonema*, &c., on outcrops running nearly N.W. and S.E., which throw off the cupriferous sands east and west. The western of these outcrops in its southern continuation near Sakmarsk is charged with Permian fossils, including the above. The same limestone, regarded by the author as belonging to the Zechstein, crops up in other places, and apparently underlies the whole basin of the steppe, the upper sandstones resting conformably upon it. From the latter the author gave the following list of fossils:—*Cardiopsis Kutorgæ* (= *Aroides crassispatha*), *Walchia biarmica* and *piniformis*, *Lepidodendron*, *Schizodendron tuberculatum*, *Anomorrhœa Fischeri*, *Caulopteris* —?; *Calamites infractus*, *Suckowi*, *gigas*, and *leioderma*; *Unio umbonatus*, *Platyops Richardi* (a Labyrinthodont), *Rhopalodon Wangenhäuseri*, *Chlorhizodon orenburgensis*, *Deuterosaurus*, and various Labyrinthodont and Reptilian remains. Upon these the author remarked that the list of plants has a Palæozoic aspect, while the Reptilian remains seem to be more of a Secondary character. After consideration of all the facts, the author came to the conclusion that possibly some of the beds in the central part of what is known as the Permian basin may be passage-beds between the Permian and Trias, but that the Kargaliusk series includes the uppermost beds of the Permian.

4. "On Chilostomatous Bryozoa from Bairnsdale (Gippsland)." By A. W. Waters, Esq., F.G.S.

This paper continues the author's papers on South-Australian Bryozoa, already communicated to the Society. It describes a collection made by Mr. J. R. Y. Goldstein, containing 40 forms, of which 12 were not previously known to have existed in Australia. Several species, however, known in other places as incrusting, here occur in the *Eschara* habit; and all together the number of incrusting species from this locality is small. The author calls attention to the frequency with which the Australian Bryozoa exhibit different modes of growth, showing the importance of preferring for classification zoœcial to zoarial characters. The three localities in Australia have furnished 126 species of Chilostomata, of which 51 are known living and 41 fossil; 14 are considered identical with European Miocene species, 17 with Pliocene, and 4 are thought to be identical with Cretaceous species. The author gives a detailed description of the various species in his Bairnsdale collection.

5. "The Silurian Species of *Glaucanome*, and a suggested Classification of the Palæozoic Polyzoa." By G. W. Shrubsole, Esq. F.G.S., and G. R. Vine, Esq.

The authors discussed the history of our knowledge of the genus *Glaucanome*, and especially of the Silurian species. They then characterized the genus, to which they refer only the Bala species formerly regarded as identical with *G. disticha*, Goldf., but which they describe as *G. Sedgwickii*, Shrubs. *Glaucanome disticha*, Goldf.,

from the Wenlock of Dudley, is taken as the type of a new genus *Arcanopora*.

The authors then remarked upon the characters on which the classification of the Polyzoa is founded, drawn from the study of the recent forms, and stated that throughout the Cainozoic and Mesozoic series no Polyzoa are known which cannot be referred to the recognized groups. Many Palæozoic forms are in a different case. The orifices seen on the surface are not, in many instances, the mouths of the cells, but those of what the authors call *vestibules*, beneath which the true cell-mouth is concealed. For these types they propose to found a new suborder under the name of CRYPTOSTOMATA, and characterized by having the zoœcia subtubular, or, in section, slightly angular, and the orifice surrounded by a vestibule or otherwise concealed. The families referred to this group are the Ceramoporidæ, Ptilodictyidæ, and Arcanoporidæ.

MISCELLANEOUS.

Notes on the Luminosity of the Sea, taken on the West Coast of Norway from September 1881 to April 1882. By W. E. KOCH, B.A., F.G.S.

I TRUST the following notes may be of interest to naturalists, although I fear there is nothing new about them.

During my travels I was much struck by the almost constant luminosity of the waters: but I also noticed great variations in its intensity; sometimes it was quite as brilliant as I have ever seen it in southern climes, at others much fainter. It struck me that some of the flashes of light emitted by certain forms resembled the steel-blue spark of an electric machine; hence I was led to try certain experiments with magnetized needles in buckets of water. The results obtained were decidedly disappointing; but nevertheless I feel sure that a great deal of the so-called phosphorescence is due to animal electricity, and I hope some one more competent and better fitted out than myself may undertake this line of research. Another fact which seems to fall in with this idea is that during thundery weather and displays of the aurora borealis the luminosity was most intense.

The highest temperature registered at night at the surface-water was 45° F., the lowest 32° F.; and on both occasions the luminosity was equally brilliant.

The small light-emitting animals were of the usual types (*Hydromedusæ*, *Medusæ*, *Ctenophora*, &c.); but many were embryonic forms quite unknown to me.

To quote from my diary:—

“September 14, 1881. Weather cold and windy (west wind). Waters crowded with medusoid forms; and all the way from Stavanger to the Lysefjord (15 English miles) the luminosity was most marked.

“September 29, 1881. East wind, fine and cold. Waters extraordinarily clear, so that forms of life could be easily distinguished